



GOING THE DISTANCE

MONCABLO helps to detect and locate insulation defects along several kilometers of power cable

Elia, the transmission system operator in Belgium, is busy completing a large-scale expansion of its high-voltage power grid in Flanders called the Stevin project. One phase of this project was to add four buried cable circuits, each comprising three 380 kV cables over a distance of 10 kilometers (6.21 miles) between two substations.

Ensuring reliable operation

"The Stevin project is critically important for strengthening the high-voltage grid in Belgium," says Pieter Leemans, Elia's Asset Manager for MV and HV cables, "so we must guarantee the functionality and stability of the new cable links. The best way for us to do this is through real-time monitoring of the dielectric condition."

"Not only did we need a partial discharge (PD) monitoring system to perform a site acceptance test on the high-voltage cable dielectric to be sure that the cable links were PD-free before commissioning," he explains, "we also need the same system to continuously assess PD activity during operation of the entire cable system."

"We chose OMICRON's MONCABLO solution because it provided the best match for our criteria for a cable monitoring system. Most importantly, we were impressed with OMICRON's flexibility, structured organization and detailed explanation of how it would meet our system requirements and implementation milestones."

Multiple monitoring points

The MONCABLO PD monitoring system was installed on all four 3-phase cable

circuits, covering 24 outdoor terminations and 132 buried connections, making a total of 156 monitoring points. "Each monitoring point has three high-frequency current transformers (HFCTs) to collect PD signals at the grounding connections of each phase, which are connected to a data acquisition unit to pre-process the data," clarifies Mario Sarens, the Elia Project Leader responsible for on-site installation. "Multiple data acquisition units are connected in a daisy chain by a fibre optic cable to a data collection unit, which then sends the data to our central server and SCADA system in Brussels," he adds.

Solving installation challenges

"The MONCABLO system has a flexible design that was successfully customized to match our cable system layout and special installation requirements," he explains. "For example, the groundwater level is high in this part of Flanders, so we installed the buried monitoring components at the cable joints in sealed cement containers, and the HFCT sensors were immersed in gel to keep them dry and maintain their integrity."

"An additional challenge was how to power the buried monitoring equipment. In the end, we installed a low-voltage power cable alongside the high-voltage cables over their entire length," Mario Sarens describes. "This solution was the result of collaboration between OMICRON's and Elia's technical experts to produce the best design for the LV cable that keeps HV interference to a minimum while also ensuring personal safety," he concludes.

Localizing defects

"The MONCABLO system is designed to detect and identify the exact location of PD-related defects along the entire length of each cable," says Pieter Leemans, "but the system can also inform us by e-mail when PD activity exceeds pre-set warning and alarm

thresholds. This enables quick, detection-based responses and will help us reduce maintenance needs."

An intuitive web interface

"We can swiftly access stored PD data from any remote location using the MONCABLO software's intuitive web ▶

«The MONCABLO system has a flexible design that was successfully customized to match our cable system layout and special installation requirements.»



Mario Sarens
Stevin Cable Project Leader, Elia



The cement boxes protect the HFCT sensors and data acquisition unit against ground water and dust.

interface," he continues, "we can view the PD status of each monitored accessory as well as real-time and historical trend curves for each phase of every cable circuit. Various automated features enable us to conveniently evaluate the PD data. OMICRON's unique 3PAR diagram and automatic cluster separation allow us to separate external noise from PD signals and determine the phase of signal origin," he describes.

Correlation with other monitoring data

"As well as PD monitoring, MONCABLO's software can be expanded to cover other parameters, such as verifying the functionality of cross-bond joints and detecting cable sheath faults," says Pieter Leemans. "The data from multiple monitored parameters can be displayed on a single graph for a full insulation diagnosis." ■

«The MONCABLO system is designed to detect and identify the exact location of PD-related defects along the full length of each cable. It can be extended to monitor other parameters in order to reduce our future maintenance activities on our 380 kV cable system.»



Pieter Leemans
Asset Manager for MV and HV Cables, Elia

 www.elia.be

MONCABLO's software simultaneously shows the PD status of all monitored cable accessories.

MONCABLO

- > Synchronous PD data acquisition at all cable accessories
- > Advanced defect localization along the cable's entire length
- > Integration with third-party sensors and SCADA systems

 www.omicronenergy.com/moncablo

